EPRI | ELECTRIC POWER RESEARCH INSTITUTE

CRA INTERNATIONAL

September 24, 2007

Michael Gibbs
California Air Resources Board
c/o California EPA
1001 I Street
Sacramento, California 95812

Dear Michael:

On behalf of the Electric Power Research Institute, CRA International (CRAI) analyzed the economic impacts of the nine Climate Action Team (CAT) scenarios discussed in Cal/EPA's "Updated Macroeconomic Analysis of Climate Strategies Presented in the March 2006 Climate Action Team Report." A full report on this analysis will be available on EPRI's website (www.epri.com) by early October 2007.

CRAI employed its multi-state computable general equilibrium (CGE) model – MRN-NEEM – to analyze the economic impacts of these scenarios on the state of California over a time horizon from 2010 to 2050. It simulates the entire U.S. and has power plant level detail on the electricity sector. Our study concluded that employing fewer energy efficiency standards led to lower costs for the state. That is, the most cost-effective policy for the state to enact to control GHG emissions would be a pure cap and trade program that covered all sectors and contained no mandated energy efficiency standard programs. This contrasts with what was found by the E-DRAM and BEAR models, which analyzed the same nine scenarios.

Table 1 summarizes the E-DRAM, MRN-NEEM, and BEAR model results from analyzing Scenarios 1-8. The table also includes results from MRN-NEEM's analysis of an economy wide pure cap and trade program that has **no** programs involving energy efficiency standards.

Table 1: Macroeconomic Impacts of CAT Scenarios on California

	Change in 2020 Personal Income (%)			Change in Welfare (%)	2020 CO2 Permit Price (2006$/MT of CO2)		
Scenarios	**E-DRAM**	**MRN-NEEM**	**BEAR**	**MRN-NEEM**	**E-DRAM**	**MRN-NEEM**	**BEAR**
Pure Cap & Trade No Offsets		-1.09%		-0.49%		$85	
Scenario 1	0.90%	-1.60%	-0.60%	-0.61%	$21	$42	$22
Scenario 2	0.90%	-1.40%	-0.70%	-0.49%	$13	$35	$7
Scenario 3	0.90%	-1.40%	-0.60%	-0.49%	$21	$35	$22
Scenario 4	0.90%	-1.50%	-0.60%	-0.52%	$21	$45	$22
Scenario 5	NA	-1.60%	-0.60%	-0.64%	NA	$45	$80
Scenario 6	NA	-1.40%	-0.60%	-0.50%	NA	$39	$17
Scenario 7	0.50%	-0.80%	-0.70%	-0.49%	$45	$86	$206
Scenario 8	NA	-0.70%	-0.90%	-0.55%	NA	$190	$442
Notes: NA: E-DRAM was not able to analyze these scenarios.							
Scenarios 2-4 and 6-8 allow offsets, which reduce costs							
Despite having offsets, Scenarios 2-4 and 6-8 have higher or equivalent costs (as measured by welfare impacts) of those of the pure C&T scenario							

The MRN-NEEM results suggest that market based policies are less costly than policies that mandate energy efficiency standards. The pure cap and trade policy has lower welfare losses than Scenarios 1 and 5, which also have no offsets, but include energy efficiency standards. Removing the energy efficiency standards reduces welfare losses by about 20%. While MRN-NEEM finds that adding in the energy

efficiency standards raises costs, E-DRAM and BEAR find the opposite effect. Comparing the change in 2020 personal income of scenario 7 to scenario 3, respectively, shows that cutting the effectiveness of the energy efficiency standards increases costs in the E-DRAM and BEAR models whereas costs decline in the MRN-NEEM model.

This difference in results hinges on a difference in modeling assumptions regarding the presence of market failures (a market failure is a situation in which consumers make uneconomic choices providing an opportunity for regulators to improve economic welfare by intervening). In the modeling of the scenarios, MRN-NEEM assumed perfectly functioning markets; whereas E-DRAM and BEAR models assumed the existence of market failures that could be corrected with energy efficiency standards (e.g., vehicle emission standards).

As a bit of background, CAT felt that the MRN-NEEM model was sound, but decided not to include the study results in their report because the CRAI team did not apply the ARB's cost assumptions for the strategies that involved energy efficiency standards. CRAI analyzed all the scenarios, but in the 11th hour, the CRAI team and Cal/EPA discovered that there was an important miscommunication. EPRI and CRAI thought that the analysis was to use ARB's estimates for emission reductions for each policy and the model would endogenously determine the costs and benefits of these reductions. CAT, on the other hand, expected that we would use ARB's costs and benefits in addition to their estimates of emission reductions for the different strategies.

We feel that there are two problems with CAT's approach. One has to do with how welfare and policy analysis should be conducted and the second has to do with a difference of opinion over the presence of market failures in the California economy.

First, including the costs and benefits derived from another source would be an illegitimate manipulation of a model because one would be calibrating that model to one set of assumptions in the baseline and a different set of assumptions in the scenario. This would be presupposing the answer (in which case, why do we need a model at all?). Not only that, but also imposing these costs and benefits would be creating an internal inconsistency within our analysis – which is exactly what using models is supposed to help analysts avoid.

The second issue, which is the underlying difference in model assumptions, is mainly a disagreement about the pervasiveness of market failures. CAT and CRAI/EPRI reached different conclusions on this issue. CAT believes that market failures are pervasive when it comes to individuals and businesses making the correct decisions regarding energy use. That is, individuals and corporations make incorrect decisions because they do not see the full cost of their decisions. Under this belief, there are benefits to imposing energy efficiency standards because if designed correctly they can correct these market failures and result in an outcome of lower emissions and net economic benefits i.e. the benefits measured in forgone energy payments exceed the costs of imposing the standards as measured by the costs of more efficient technology and implementation costs of the standards. However there is a large body of economic literature that supports the opposite view that market failures, though present, are relatively small. Therefore, our team concludes that market based approaches to climate change are more efficient than technology standards. Furthermore, our team concludes that imposing energy efficiency standards leads to market distortions.

As an example of energy efficiency standards, this comment focuses on auto efficiency standards, but the logic applies to energy efficiency standards in general. As part of the modeling exercise, CAT wanted all modelers to assume that implementing vehicle efficiency standards would result in net benefits (i.e., cost savings to consumers from lower energy payments would exceed the costs of more efficient vehicles) of over $5 Billion in 2020. For this to be true, market failures must exist whereby consumers are purchasing too much fuel and not enough fuel economy and auto manufacturers are not producing vehicles with enough fuel economy. In other words, either the market is providing incorrect price signals or consumers and producers

are consistently mistaken in just one direction in deciding how much fuel economy is worth buying. One of the other of these conditions must hold to cause consumers and auto manufacturers to make inefficient decisions. For if no market failures existed, consumers and producers have every incentive to balance their private costs of improving fuel economy versus savings in fuel expenditures, implying that adding efficiency standards would result in higher costs because these standards would force manufacturers to produce vehicles that consumers would not want.[1]

Therefore, the central question is: Do significant market failures exist? We, along with a number of distinguished economists,[2] have concluded that in the specific energy markets at issue in California the answer is no, but we recognize that there are differing opinions on this issue. Though it is too late to include alternative positions in this latest Cal/EPA report, we hope that in future reports the Cal/EPA is able to include a discussion of the economic literature so that the public and the regulators can better understand the important issues and impacts of their assumptions. The broad conclusion that market based policies tend to lead to more cost-effective outcomes in the absence of market failures should be carefully considered by regulators as they move forward with developing policies to ensure that California complies with AB 32.

Sincerely,

(Transmitted via email)

CRA International, Inc. and Electric Power Research Institute

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[1] ARB finds net benefits for auto efficiency standards under current fuel prices and hence in the absence of any GHG abatement policy. Therefore, Californians would benefit if the policy were put in place today.

[2] For example, please see “Analyses of California Climate Change Policy: Are They Too Good to Be True?,” by Robert N. Stavins, Judson Jaffe, and Todd Schatzki, RFF DP 07-12, March 2007 and “Demand-Side Management and Energy Efficiency in the United States” by Loughran and Kulick, *The Energy Journal* (Vol. 25 No. 1), 2004.